should make us critical of unanalyzed figures on the causative relation of that procedure to the falling diphtheria mortality.

Although San Francisco figures are not available to indicate the value of toxin-antitoxin, there is ample evidence of its efficacy where immunization has been extended to a considerable proportion of the population. In Auburn, New York, a city of 36,000, where 85 per cent of the school children have been immunized, Sears reports that in the past three years cases have been reduced from about eighty-five to five per year, and deaths from fifteen to one, and that one a questionable diphtheria case.

An intensive study of some 8,000 children immunized in Providence shows that approximately 90 per cent of the children who received three injections of toxin-antitoxin were subsequently protected against diphtheria. As few of these children were retested (Schick), it is probable that such cases as did occur were in children who failed to acquire immunity in one course of injections. Among 15,000 children immunized or naturally Schick-negative, the prevalence of diphtheria has been only one-tenth of the rate in the same group of the rest of the population.

If toxin-antitoxin is to play any important part in the control of diphtheria, it is self-evident that a considerable proportion of the children in the more susceptible age groups must be immunized. The ideal procedure would include immunization of the preschool group, say, from one to four years. Immunization at this time would carry the child over the period of highest fatality and greatest susceptibility to diphtheria. On account of the administrative difficulty in reaching children of this age, it is questionable whether large cities will be able to secure immunization of a sufficient proportion of this population to control diphtheria. Immunization of pupils in the kindergarten and first grade leaves unprotected the children at the ages in which the highest case fatality from diphtheria occurs; but, from the administrative standpoint, it is probably the most practical scheme.

If any considerable proportion of the school children are immunized, there is also a definite reduction in the exposure in the home of younger children who are themselves less liable to come in contact with cases. No one has yet shown just what proportion of the population needs to be immunized to prevent any serious spread of a disease of low infectivity such as diphtheria, but it can be seen off-hand how rapidly the increase of immunes decreases the opportunity for effective contact between susceptibles.

Although there is no evidence that toxin-antitoxin has been an important factor in the marked decline of diphtheria in San Francisco and elsewhere for the past six years, there is every reason to believe that if immunization is extended to a considerable proportion of the children in the most susceptible age groups, it can be more definitely the deciding factor in the ultimate control of diphtheria.

(To be continued)

# CLINICAL NOTES AND CASE REPORTS

## SOLID TERATOMA OF OVARY

*By* R. W. BINKLEY, M. D.
*Selma*

IN going over the literature on teratomata of the ovary, one is at once impressed by the lack of uniformity in classification of these growths, and also the admission, by practically all writers, of the inadequacy of the present classification.

By most of the writers, for example, they are divided into cystic teratomata and solid teratomata, both forms being called teratomata owing to the fact that the histogenesis of the two is apparently the same. Then, in speaking of this growth, one must qualify the type to which reference is made, since, from a clinical standpoint, they are vastly different.

Because most of us are familiar with the term "dermoid cyst, and with the growth itself, it seems that a clearer classification is that of Lynch, who on account of their common origin, classifies them as embryomata (a term which in itself gives a clue to the origin) and then subdivides embryomata into (*a*) dermoid cysts and (*b*) teratomata. With this classification, one must not confuse the ovarian dermoid, or cystic teratoma, with the true dermoid of ectodermal cell inclusions along the lines of embryonic fusion. Both types of embryomata are potentially tridermal, though at times all three layers may not be demonstrable, and the essential difference histologically is in the age of their embryonic cells.

The dermoid has progressed in a more orderly way toward the formation of definite organs, though very imperfect; while the teratoma has advanced too rapidly to develop a definite pattern, and is composed of a jumbled mass of embryonic cells with little attempt at organ formation. Askanazy proposes the name "teratoma embryonale" for the solid ones, and "teratoma adultum" for the dermoid cysts.

The histogenesis of these two types of growth is still conjecture, and neither of the two advanced theories, nor a combination of the two, will as yet serve without criticism.

The blastomere theory of Marchand and Bonnet is favored by some writers as adhering more closely to nature's fundamental principles; but by this theory it is difficult to explain authentic cases of ten dermoids in one ovary, and eleven in another. The multiple origin of ovarian dermoids is best explained by the germ cell theory of Wilms; but this theory, too, fails in explaining such growths as occasionally occur remote from the ovary.

It is evident that if they have their beginning early enough, the cells from which they arise are totipotent and capable of giving rise to ectoderm, entoderm, and mesoderm.

Admitting a common origin of all embryomata, from a clinician's viewpoint, they are widely dif-

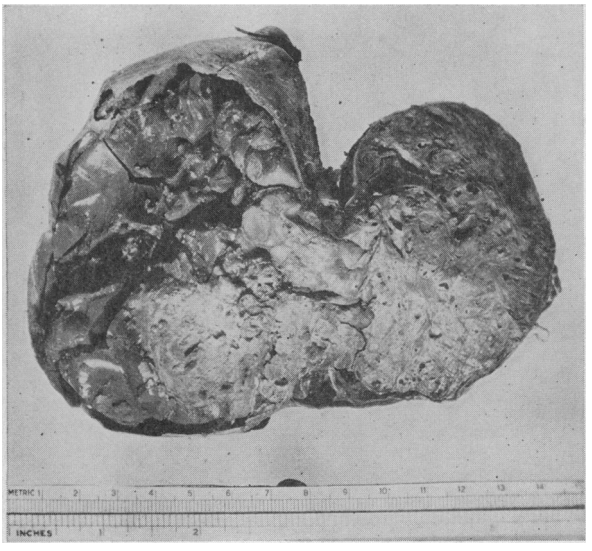

Fig 1.—Photograph of the original tumor sectioned.

ferent. The dermoid is one of the commonest ovarian neoplasms encountered, constituting, in various estimates of literature, from 5 to 15 per cent of all ovarian tumors; and the casual operator is familiar with their gross pathology and clinical history, their course being essentially benign.

The case I wish to present is one of teratoma, often spoken of as solid teratoma, and one which invariably gives a different clinical picture. It is a very rare condition by comparison, literature giving us less than one hundred cases in all. There was no record of a case in the Bellevue Hospital up to 1925, though their gynecologic cases averaged eighteen hundred per year.

It is attended by a grave prognosis, the mortality being generally estimated at from 80 to 97 per cent. Frank collected a series of thirty-seven cases, with a mortality of 97.2 per cent. Pfannenstiel found a mortality of 86.8 per cent in a series of thirty-two cases. Geist gives a mortality of 85 per cent. Harris reports a patient well after ten years who was operated upon at the age of five years and ten months, and who at that age had developed premature puberty and precocious somatic development. The growth from this patient showed definite malignant changes. The operation consisted of removing the involved ovary and tube; the normal ovary and tube of the other side, together with the uterus, being left intact.

The surgical procedure in these cases depends upon the surgical judgment of the operator, and the limited experience of others; but a complete removal of the involved side intact is imperative, as puncturing or rupturing of the growth will lead to implantations. In the case of dermoids of the ovary, the procedure may be more conservative, especially during the child-bearing age.

## REPORT OF CASE

The patient, a girl thirteen years of age, was first seen on October 8, 1929, complaining of a "sideache" which had occurred at intervals for the past two months. The pain was generally in the right side, but occasionally felt in the left groin. It was always worse after exercise, and had led her to be excused from physical education work at school. Never severe enough, however, to cause her to miss school until on date of examination, at which time it was worse and was accompanied by diarrhea. She has had several attacks of diarrhea in the past two months, alternating with constipation.

*Family History.*—American, above average, intellectually and socially. Father, L and W, at 37. Mother, L and W, at 37. Two brothers, L and W, 9 and 6 years. Two sisters, L and W, 15 and 4 years.

*Personal History.*—Full term, normal delivery, birth weight eight pounds. Breast fed three months, and then on Eagle brand milk. Developed satisfactorily except nervous and restless. Always rather thin, but this was a family characteristic. No sickness in past, except measles. Frequent so-called "leg aches" since age of five. Above average in school. Has not started menstruating.

*Physical Examination.*—Well developed, fairly nourished, blond girl, who entered office walking and not giving evidence of any marked discomfort. Height, 58 inches. Weight, 86 pounds. Head, neck, eyes, ears, nose and throat essentially negative. Breasts normal for age. Heart and lungs negative except for some tachycardia, due probably to nervousness. Temperature and blood pressure, normal. Extremities and reflexes normal.

Abdomen: Patient recumbent gave appearance of a four months' pregnancy. A tumor mass was felt in the midline extending up to the umbilicus. Felt solid and smooth throughout. No fluid demonstrable in abdomen. Rectal showed pelvis filled with solid tumor mass, separate from uterus.

*Diagnosis.*—Tumor of right ovary. Surgery advised.

*Subsequent History.*—On the evening of October 11, three days after initial examination, she developed more severe pain in right side and was quite tender in R. L. Q. Urine: 1019, albumin 0, sugar 0. Microscopic negative. Blood count: Hemoglobin 70, red blood cells 4,200,000, white blood cells 18,000. Differential, not done.

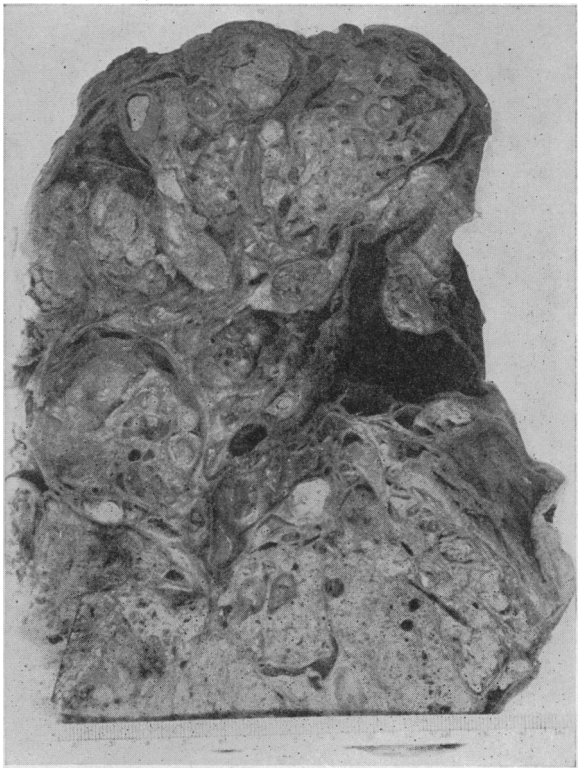

Fig. 2.—Photograph of one-half of one of the secondary tumors.

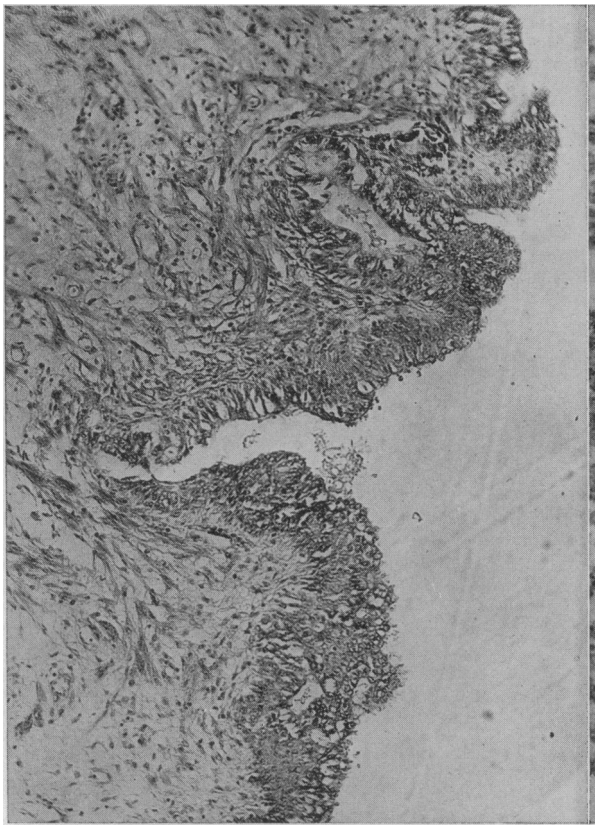

Fig. 3.—Section of original tumor.

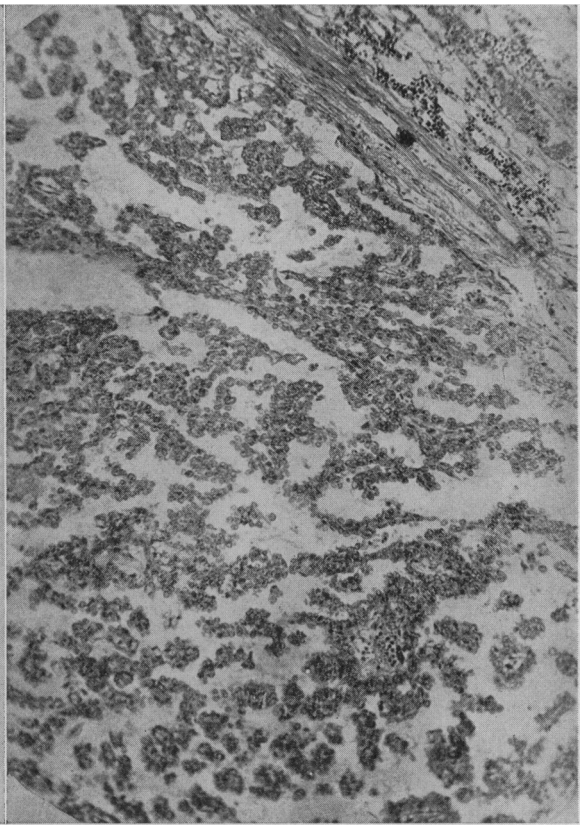

Fig. 4.—Photomicrograph of secondary tumor, showing an adenocarcinomatous arrangement. The picture was quite uniform throughout.

*Operation.*—On October 12, midline, suprapubic incision, under gas and ether anesthesia. Upon entering abdomen, free, straw-colored fluid was encountered and a tumor mass was seen to fill abdomen to above the umbilicus, and was covered by adherent omentum. Upon freeing the omentum, the lower abdomen contained bloody fluid, though no bleeding points were encountered. The omental adhesions were fibrinous, and easily freed by the gloved finger.

Further examination showed a twisted pedicle to the tumor, with one complete turn of the pedicle and the distal end of the right tube. There were two distinct parts to the tumor, separated by a slight constriction: the upper or abdominal part was cystic and the wall was transparent in places; the lower or pelvic part had to be separated, it being adherent in the cul-de-sac. The mass was removed, together with the right tube en masse.

*Gross Pathology.*—Tumor mass, 14 centimeters in length and 8 centimeters in diameter, separated into two rather distinct parts by a constriction, as shown in figure. The proximal part is solid in consistency, and has tube attached and the remains of pedicle. This part is edematous on surface and suggests the beginning of gangrene. The distal part is cystic, being smooth and translucent, except at points where fibrinous adhesions had left their mark and points where the wall was transparent. It contained a rather thin fluid with many floating particles that could be seen through the transparent portions. Tumor was fixed without opening.

*Microscopic Pathology.*—Sections taken through solid portion. The sections show a very curious picture. There is no recognizable ovarian tissue present. The stroma is made up of an embryonic type of apparently actively growing connective tissue, giving it a pale appearance. Throughout the stroma are glandular spaces, which vary markedly in size and shape. Many of the glands contain a homogeneous pink staining material; some of the glands, particularly the larger ones, are lined by an epithelium which resembles squamous epithelium. The upper layers are very much flattened, and are present as fibrillar material, pink-staining and without nuclei. Other spaces are lined by a columnar epithelium of a mucoid variety; still others by cells resembling those of the upper respiratory tract. There are small aggregations of the squamous cells described, here and there, and a number of rudimentary hair follicles, as well as sebaceous and suderiferous glands. In addition, one sees several oval bodies showing the structure of cartilage. Other bits of tissue resemble muscle, though practically no nuclear elements are seen, and there are also several areas which resemble cross-sections of nerve fibers.

A number of groups of small darkly staining cells show no definite structural arrangement; these betray a number of mitoses, and resemble somewhat the embryomata of the kidney, according to Doctor Connor. He feels that the tumor has definite malignant tendencies, and suggests very close observation of the patient, although if the tumor were free and completely removed it might carry a favorable prognosis.

Diagnosis: Teratoma of ovary. Dr. D. E. Morton.

*Subsequent History.*—Patient made an uneventful recovery, wound healing per primum and sutures removed on October 22, 1929.

Patient was requested to report at monthly intervals, but failed to do so and was lost track of until June 23, 1930, practically eight months later, when she was brought in because of her inability to control her urine. She complained of no pain, but stated that when she sneezed or coughed, or moved suddenly, she lost some urine. Examination at that time showed a huge abdominal tumor, giving appearance of a seven months' pregnancy. The tumor was lobulated and felt solid, and there seemed to be a separate mass in the left lower quadrant. Rectal showed pelvis filled with mass that was continuous with abdominal portion.

On June 24 she was unable to void urine, and required catheterization. The family was opposed to further surgery, so it was decided to try x-ray treatment; although in literature I could find record of only one case having been treated with x-rays. That case was reported by Dr. Edw. A. Bjorkenheim in *Acta Obstetricia et Gynecologica Scandinavica*, and then the x-ray treatments proved of no value. The patient was turned over to a competent roentgenologist on July 1, and at that time treatments were started.

On July 16 she was again operated upon, through a midline incision, under gas and ether anesthesia.

Upon entering the abdomen, three distinct and separate tumors were found. The one previously felt in the left lower quadrant was an omental implant, the size of two fists—glistening, grayish white in color, smooth and almost solid, but with some cystic points that bulged slightly. The next was retroperitoneal, laying slightly more to the right of midline, at the level of umbilicus, and adherent firmly to several loops of intestine. This one had several areas, rather darkly pigmented, and more cystic in character. The third one was wedged tightly in the pelvis, and extended up into the abdomen, more on the left.

Complete removal was impossible, so the omental transplant was removed for specimen, and the abdomen closed without drainage, extra stay sutures being used in anticipation of abdominal distention. The girl, however, made an uneventful recovery, and healed nicely.

Treatments by x-ray were again advised as a last resort, and the patient was once more referred to the roentgenologist.

The patient was not seen again until July 25, 1932, when the size of abdomen having decreased perceptibly, and her health having improved, she was able to return to school. She began to menstruate in November, 1931, and menstruated regularly for three months, and then skipped until May, 1932. When seen on July 25, 1932, she was complaining of pain in the right side, and examination showed the abdomen greatly distended by a huge lobulated tumor mass. The skin was tight and showed numerous striae, she was markedly anemic, and sick-looking.

By August 15, 1932, the pain was so severe and cramps in the right leg so intense, as to require morphin for relief. Her condition grew rapidly worse, until she expired at 6 p. m. on August 21, 1932.

*Postmortem.*—The parents would consent only to opening of the abdomen. Extremely emaciated young woman, with abdomen distended far beyond size of a full-term pregnancy. Frame appeared as a skeleton, with but slight covering. Abdomen was opened from xiphoid to symphysis, and the abdomen was filled by the two tumor masses described at the second operation. The intestines were all displaced to the flanks, and the omentum was contracted high, and was a contracted lace work of small, pearl-gray tumors, varying in size from pin point to a marble, most of them being about the size of a grain of wheat and up to that of a pea. The parietal peritoneum was studded by myriads of growths of the same character, so close together that there was not room to place a finger tip without touching one of these growths. The liver was filled with growths, the largest of which was the size of a walnut. The intestines were covered with similar implantations, but smaller, and the mesentery was filled with somewhat larger ones. Upon removing a part of the diaphragm, which was also involved, it was found that some of the growths had penetrated into the chest cavity to involve the pleura, and that the mediastinum was filled with the growths.

### COMMENT

The two main growths were removed for study, and are shown in the accompanying figures, as were also portions of other organs which were removed for sections.

Their size is indicated by the yardstick, and they were both solid, grayish white in color, nodular in part, and covered with adhesions of surrounding viscera. A gross photograph of one of these tumors sectioned is shown. The microscopic sections show a rather uniform type of growth, that is, an adenocarcinoma; but this is not unusual, and is explained on the basis of carcinomatous change in certain of the epithelial elements of the teratoma, with subsequent metastases (which may also occur in the dermoid cyst). McCallum states, "While it is true that the teratoma itself is benign, it is not at all uncommon to find the development of a distinct carcinoma at some point in its epithelium, exactly as we find it in the body in general."

### SUMMARY

1. A comprehensive classification of teratomata should be adopted.

2. The cystic and solid types have a common origin, and vary only in age of cells.

3. The prognosis in case of solid teratoma is grave; in case of cystic teratoma, or dermoid, the course is usually benign.

4. The cystic type is very common, while the solid type is extremely rare.

5. The histogenesis of ovarian teratomata is not yet satisfactorily explained by either the blastomere theory of Marchand and Bonnett, or the germ cell theory of Wilms.

6. The treatment in case of solid teratomata should be radical and with care.

Medical Building.

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## A SIMPLE DEVICE FOR USE IN THYROID SURGERY

*By* GEORGE A. JOHNSTONE, M. D.
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THE usual method of placing a patient upon the operating table for a thyroidectomy has a number of disadvantages both to the patient and the surgeon, as well as to the surgeon's assistants. For example, it is always desirable that the surgeon, when doing a thyroidectomy, should have as much exposure of the thyroid as possible by placing the patient in a position which will throw the thyroid closer to the surface of the neck. The usual method employed for obtaining this position is that of placing a sand-bag posteriorly to the cervical and upper thoracic regions of the patient; but while the purpose of this is to elevate the cervical and upper thoracic regions, it has proven very inefficient in several respects. The hardness and inflexibility of the sand-bag cause much distress to the patient. There is no way of adjusting the position of the patient for the convenience of the surgeon in opening and closing the wound without causing additional discomfort to the patient; and, furthermore, it is not possible to raise and lower that portion of the body involving surgery so as to give the correct elevation necessary to the most efficient work of the surgeon.

A sheet suspended by a frame for the purpose of separating the anesthetist's field from the field